

B' sh
C

1. (Twice Amended) An apparatus for measuring film stack characteristics of a sample, the apparatus comprising:

a beam generator configurable to direct a charged particle beam towards the sample such that the charged particle beam penetrates at least two layers of the film stack, the charged particle beam causing X-rays to emanate from the sample; and

a first and a second wavelength dispersive X-ray detector positioned above the sample wherein each detector detects X-rays about a different characteristic emission level, wherein the first detector is configured to detect X-rays having characteristic emission levels for a top layer of the film stack and the second detector is configured to detect X-rays having characteristic emission levels for an underlying layer that lies beneath the top layer.

B2
C

11. (Twice Amended) A method for measuring at least one characteristic of a film stack on a sample, the method comprising:

directing a charged particle beam towards the sample such that the charged particle beam penetrates at least two layers of the film stack, the charged particle beam causing X-rays to emanate from the sample;

detecting X-rays at a first characteristic emission level that represents an emission level for a top layer of the film stack using a first wavelength dispersive X-ray detector that is positioned above the sample; and

detecting X-rays at a second characteristic emission level that represents an emission level for an underlying layer of the film stack using a second wavelength dispersive X-ray detector that is positioned above the sample, the underlying layer being a layer of material underneath the top layer.

3
BC

21. (Once Amended) A method of determining film stack characteristic values of a sample, the method comprising:

obtaining raw data related to the film stack characteristic values from a first wavelength dispersive detector which detects X-rays emanating from a first layer of the sample;

selecting a set of estimated film stack characteristic values;

obtaining predicted data by solving equations which model a film stack configuration using the set of estimated film stack characteristic values;

comparing the predicted data against the raw data;

B3
canceled

selecting a new set of estimated film stack characteristic values when the difference between the predicted data and the raw data is larger than a predetermined margin of error;

obtaining a new set of predicted data by solving equations which model the film stack configuration using the new set of estimated film stack characteristic values when the difference between the predicted data and the raw data is larger than the predetermined margin of error; and

repeating the above operations using a second wavelength dispersive detector to detect X-rays emanating from a second layer of the sample.

26. (Once Amended) A computer-readable medium comprising computer code for determining film stack characteristic values of a sample, the computer-readable medium comprising:

C1, B4
cancel

obtaining raw data related to the film stack characteristic values from a first wavelength dispersive detector which detects X-rays emanating from a first layer of the sample;

selecting a set of estimated film stack characteristic values;

obtaining predicted data by solving equations which model a film stack configuration using the set of estimated film stack characteristic values;

comparing the predicted data against the raw data;

selecting a new set of estimated film stack characteristic values when the difference between the predicted data and the raw data is larger than a predetermined margin of error;

obtaining a new set of predicted data by solving equations which model the film stack configuration using the new set of estimated film stack characteristic values when the difference between the predicted data and the raw data is larger than the predetermined margin of error; and

repeating the above operations using a second wavelength dispersive detector to detect X-rays emanating from a second layer of the sample.

REMARKS

In the Office Action, the Examiner rejected claims 1, 3-4 and 31 as being anticipated by Soezima (U.S. Patent No. 4,962,516), claims 1, 3-4, 11, 13, 15-17, 21-22-, 24, 26-27, 29, and 31-34 under 103(a), and claims 6-7, 9, 18, 25, and 30 under 103(a). The rejections are fully traversed below. Reconsideration of the application is respectfully requested based on the following remarks.

Claims 1, 11, 21, and 26 have been amended to further clarify the subject matter regarded as the invention. Claims 3, 13, 31, and 33 have been canceled. Claims 2, 4, 6-9, 12, 14-18, and